

Science to Sustain At-Risk Terminal Lakes

Walker River Basin Project

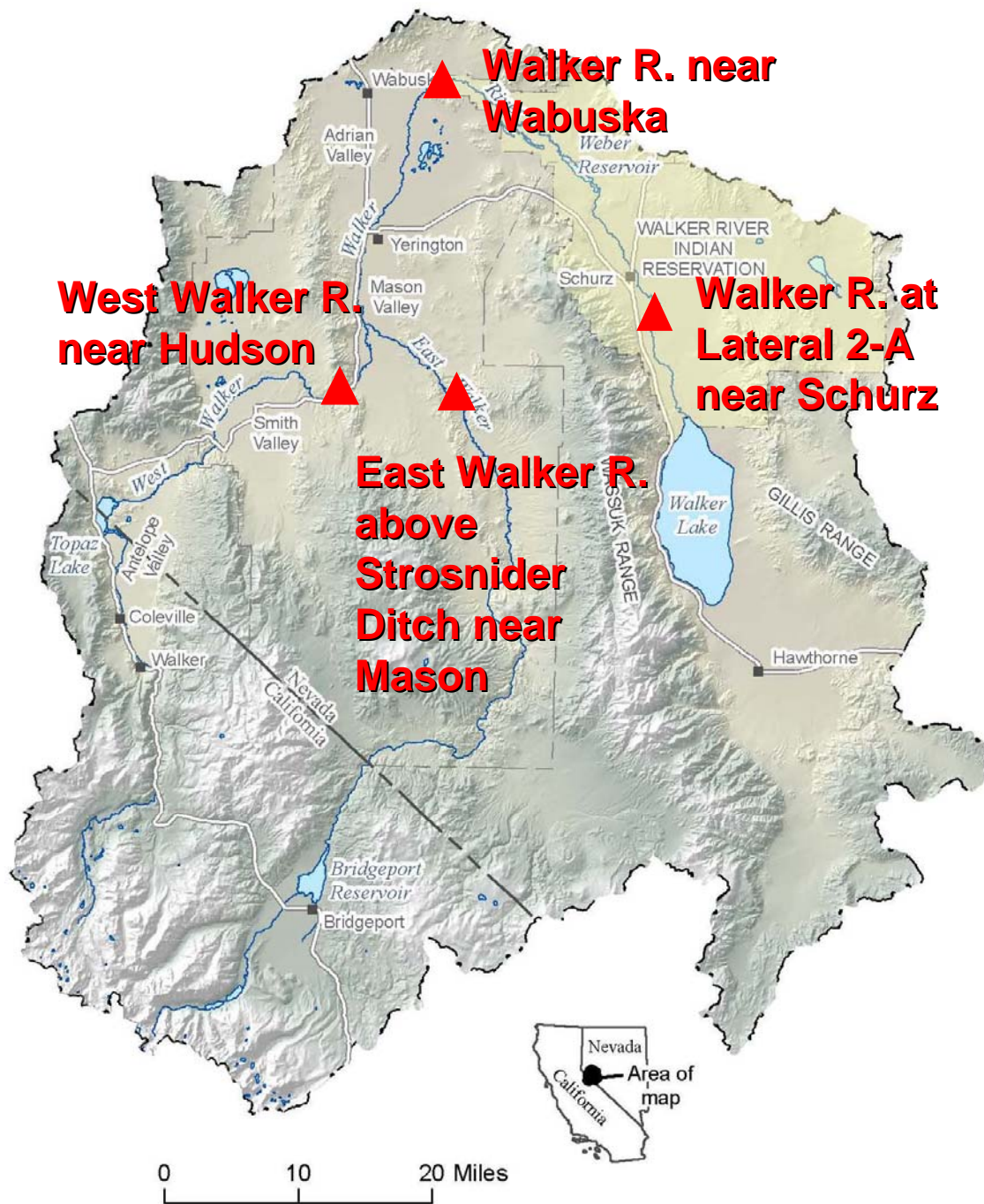


**In Cooperation with the Bureau of Reclamation
Legislative Committee on Public Lands**

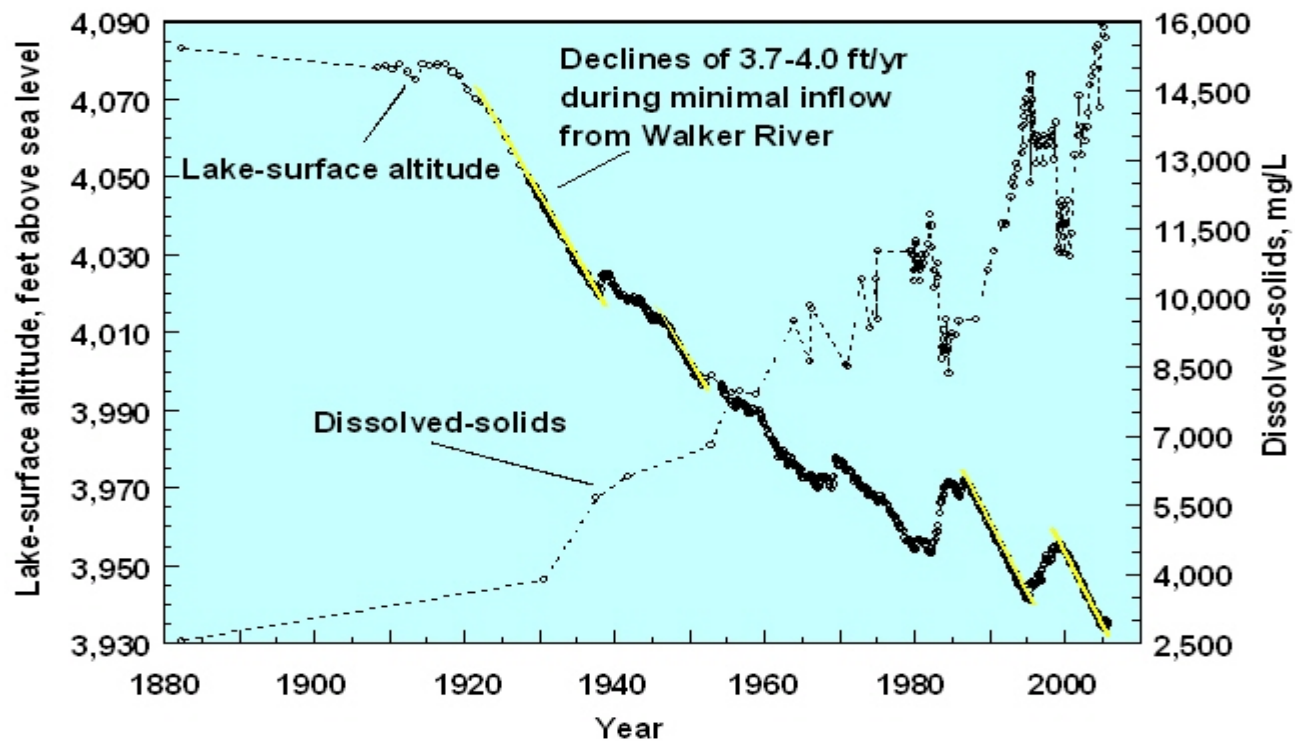
Presentation Overview

- Problem
- Objectives
- Status of activities
- Plans for upcoming year

Location of Walker River Basin

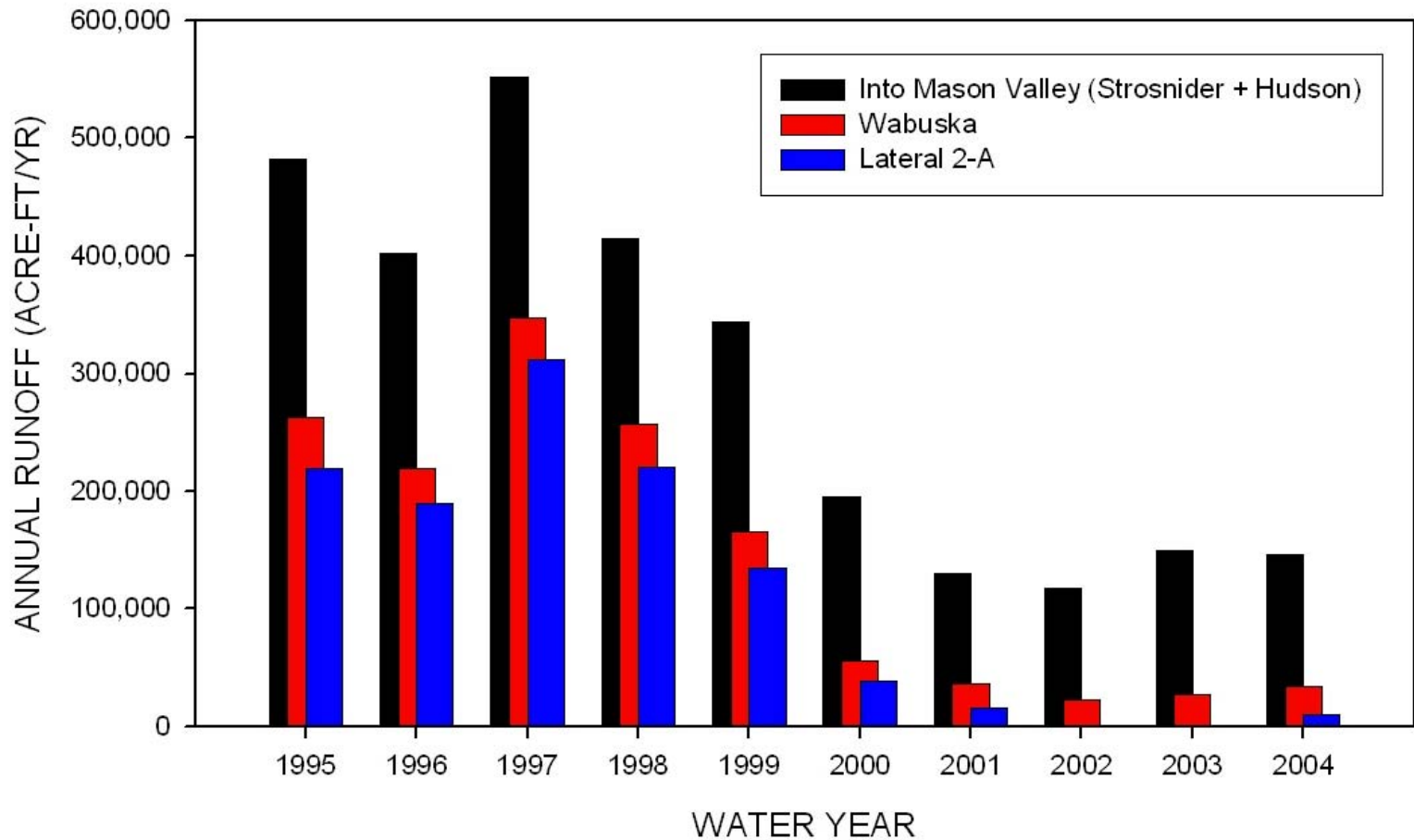


Walker Lake Salinity



Walker River Streamflow

Annual runoff for select locations along Walker River.



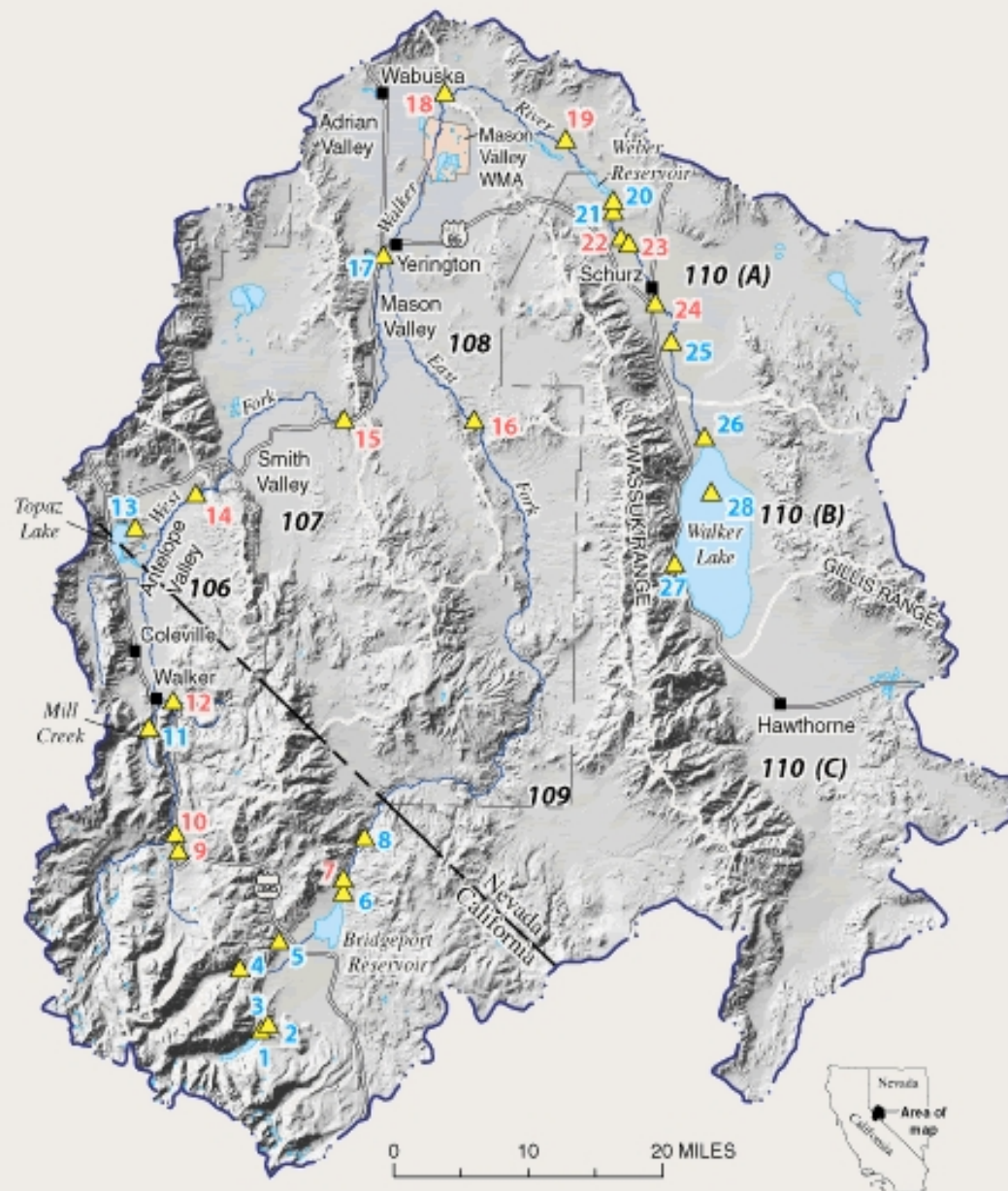
Objectives

- Quantify streamflow in the Walker Basin
- Estimate evapotranspiration from the lake and vegetation
- Develop an improved water budget for Walker Lake
- Develop the capability to predict how changes in upstream irrigation practices would affect flows to Walker Lake

Activities

- Surface-Water (SW) network
- Ground-Water (GW) network
- Evapotranspiration (ET) network
- Mapping vegetation, elevation, bathymetry
- Preliminary streamflow analysis
- Web Site

SW Network –new and upgraded gages



New Stream Gages

Green Ck near Bridgeport



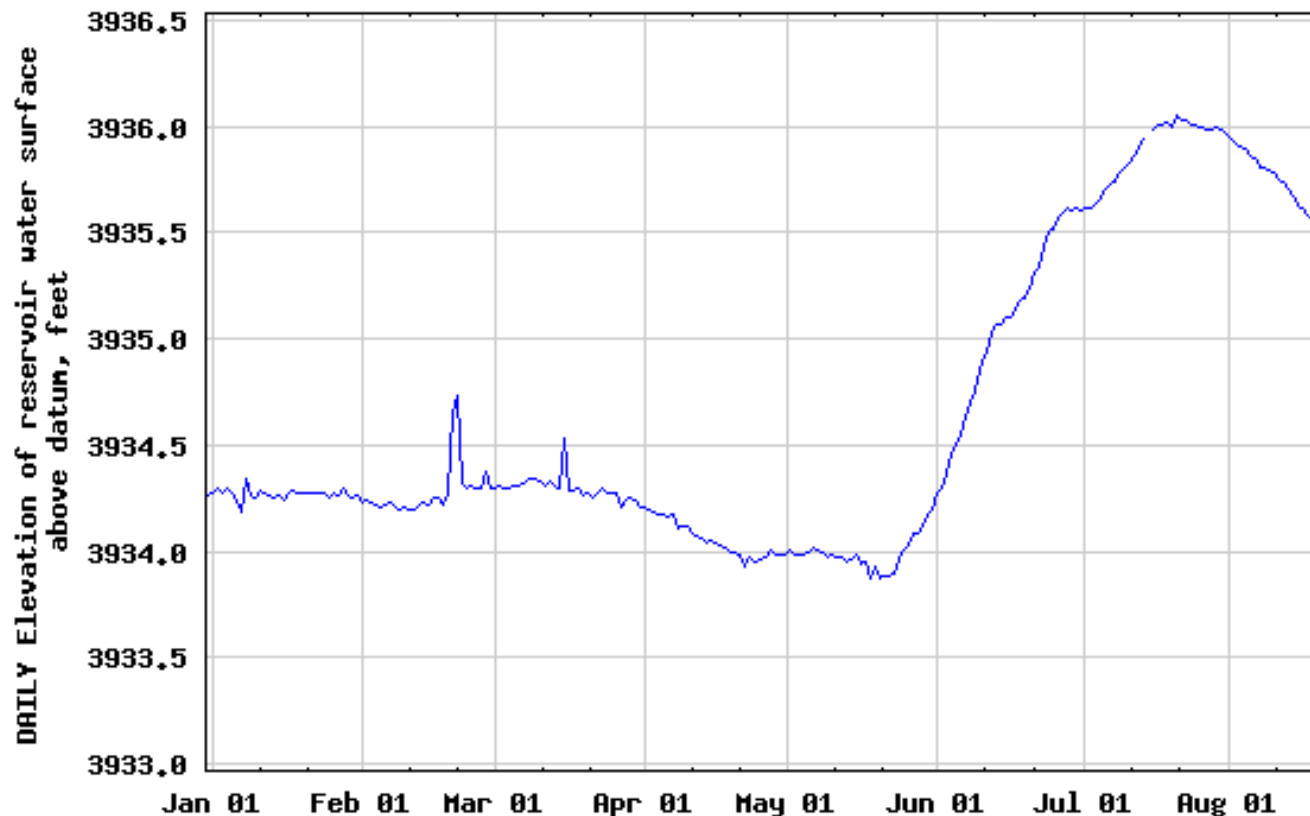
Virginia Ck near Bridgeport



Real-Time Data on Walker Lake Gage



USGS 10288500 WALKER LAKE NEAR HAWTHORNE, NV

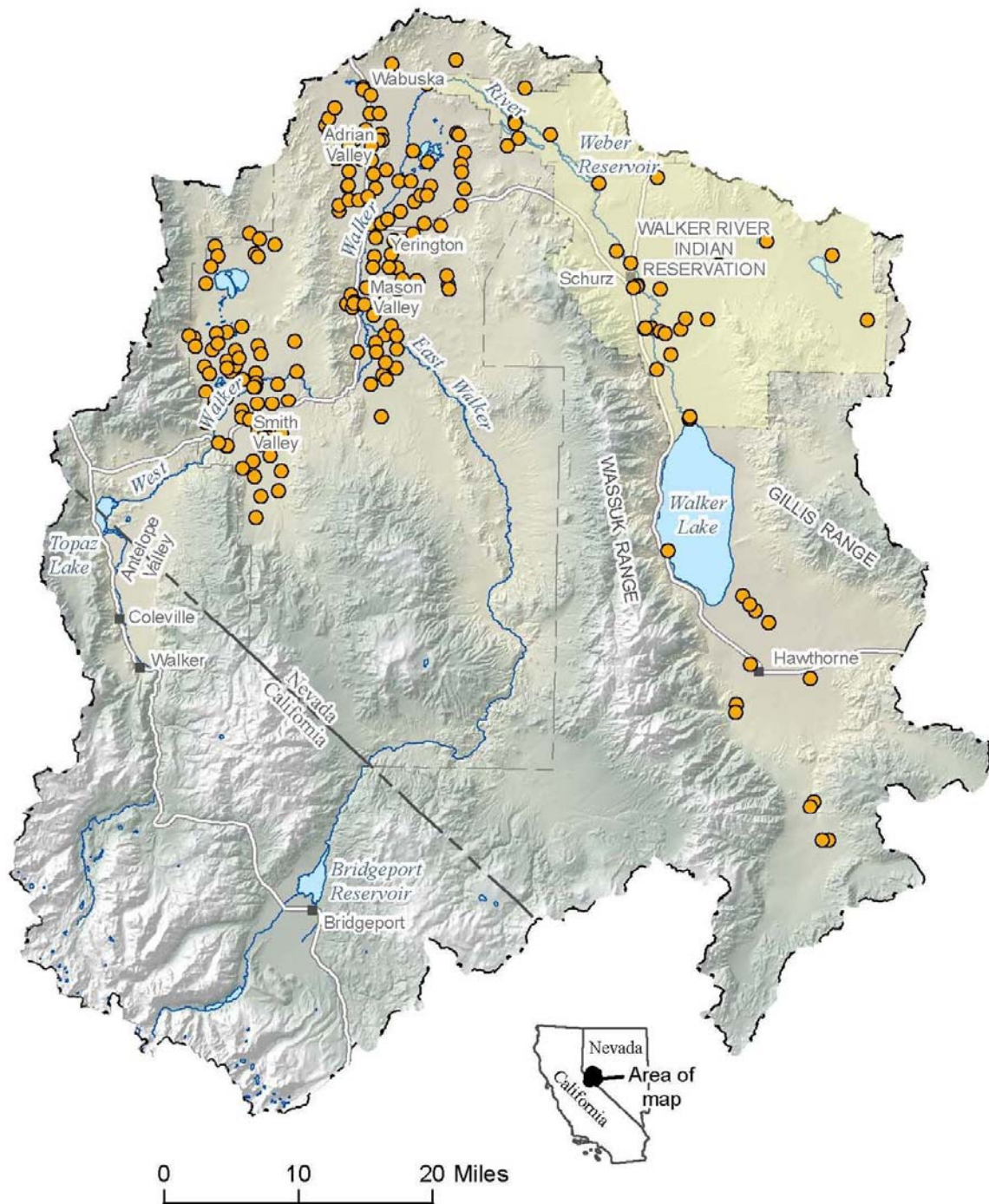


Provisional Data Subject to Revision



GW Network

- GW sites

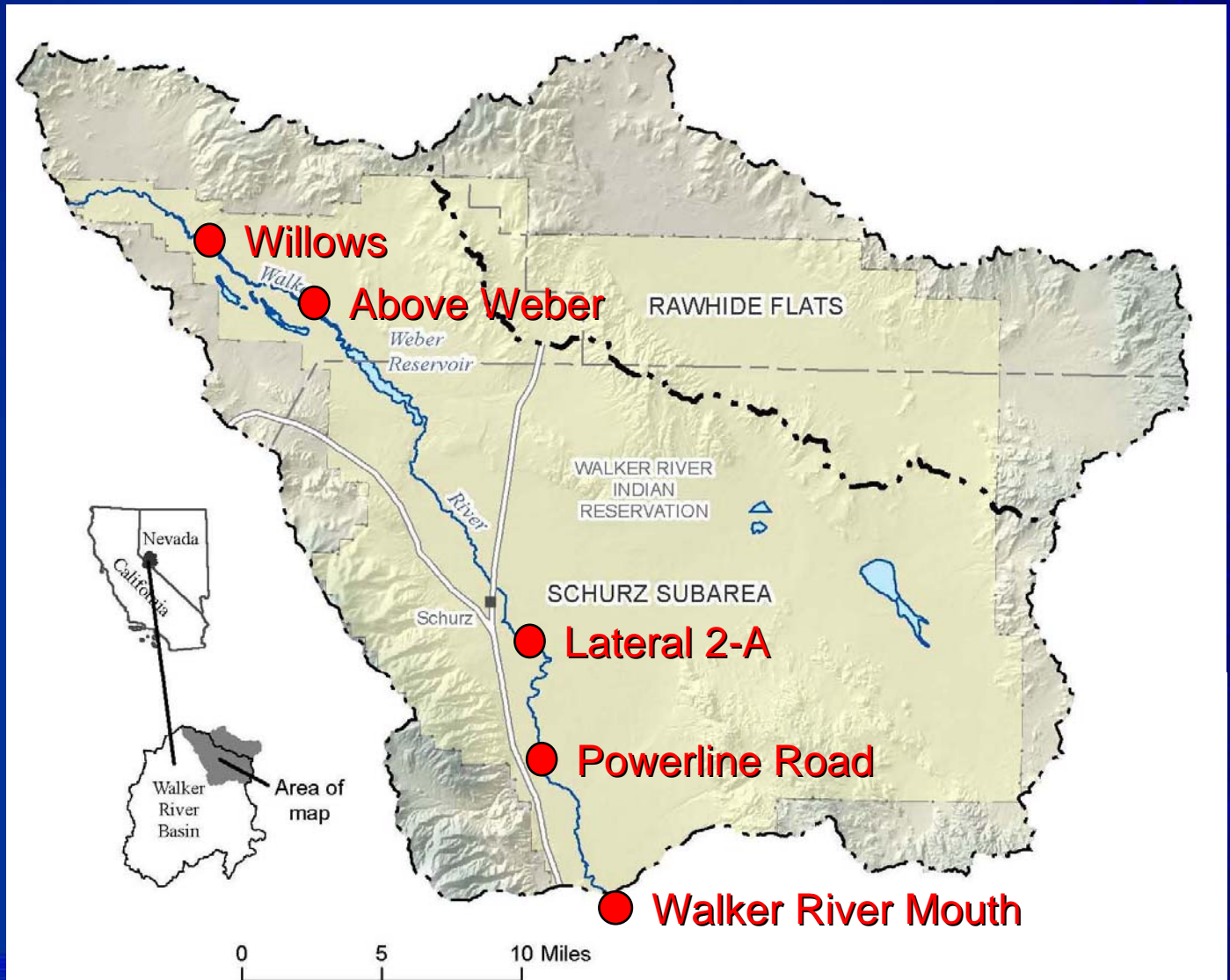


Ground-Water/Surface-Water Sites

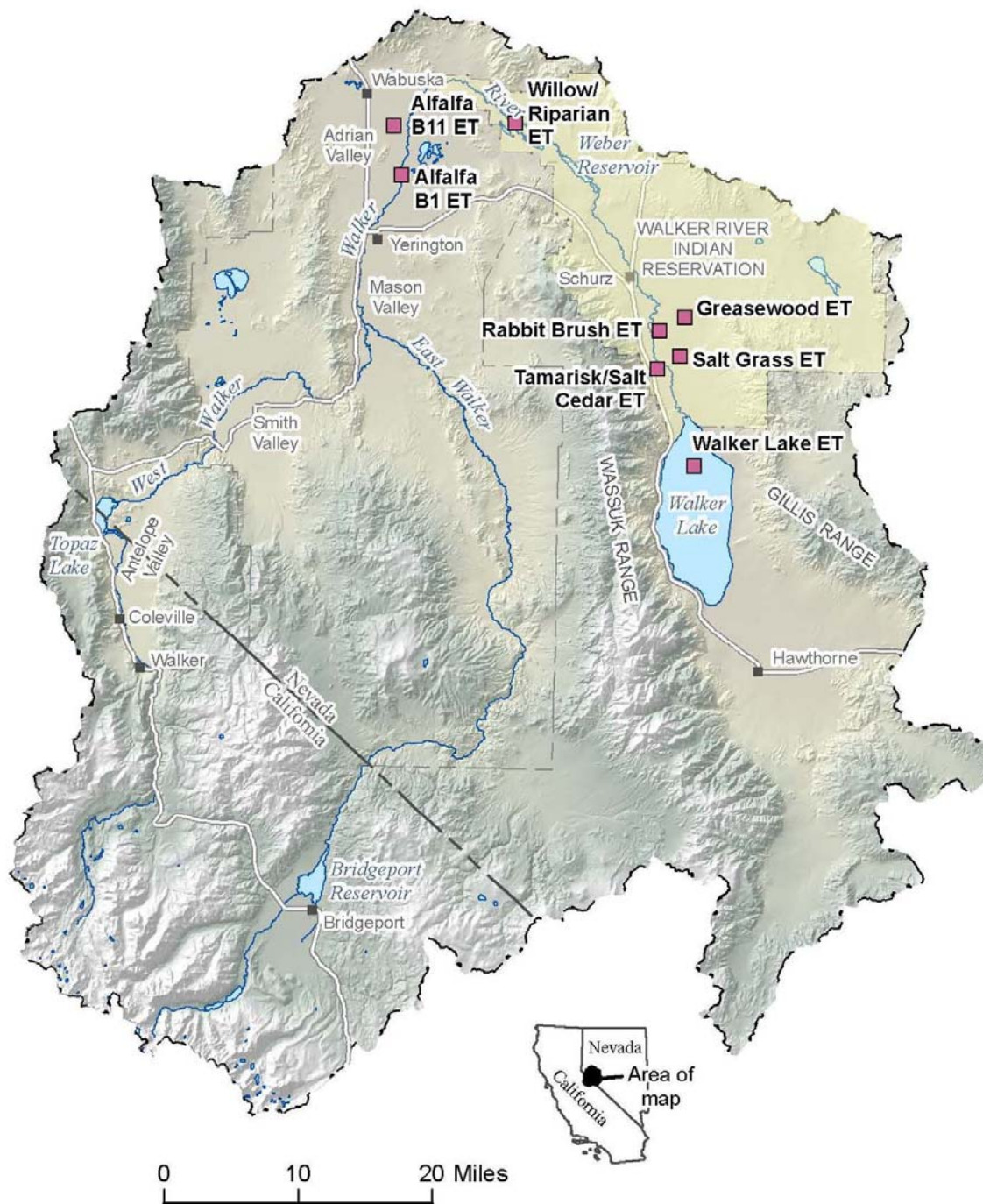
- Willows ET (above Weber)
- Cow Camp Gage
- Lateral 2-A Gage
- Powerline Road
- Walker River at Mouth



GW/SW Site Locations



ET Network

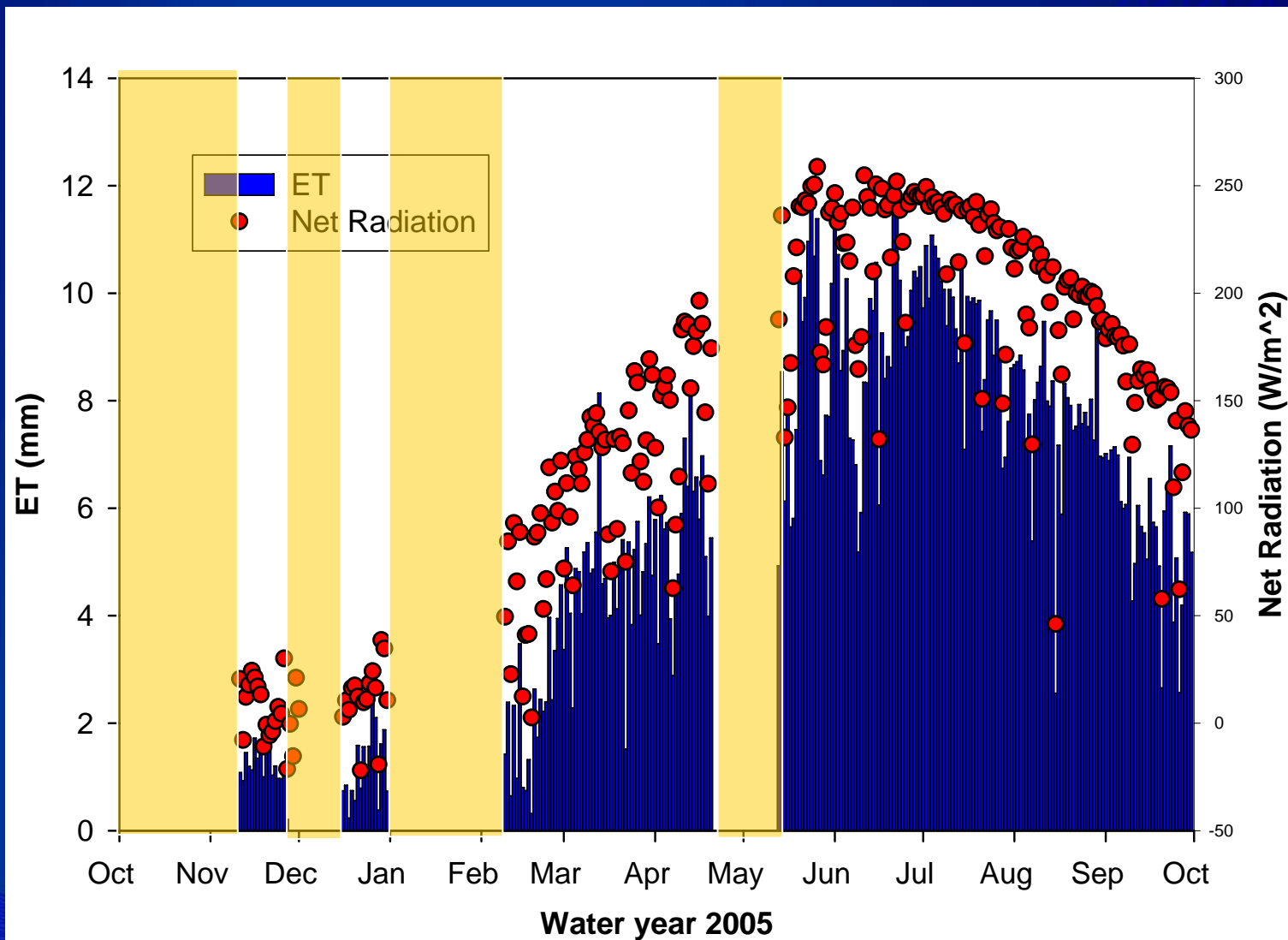


Results – ET from Walker Lake



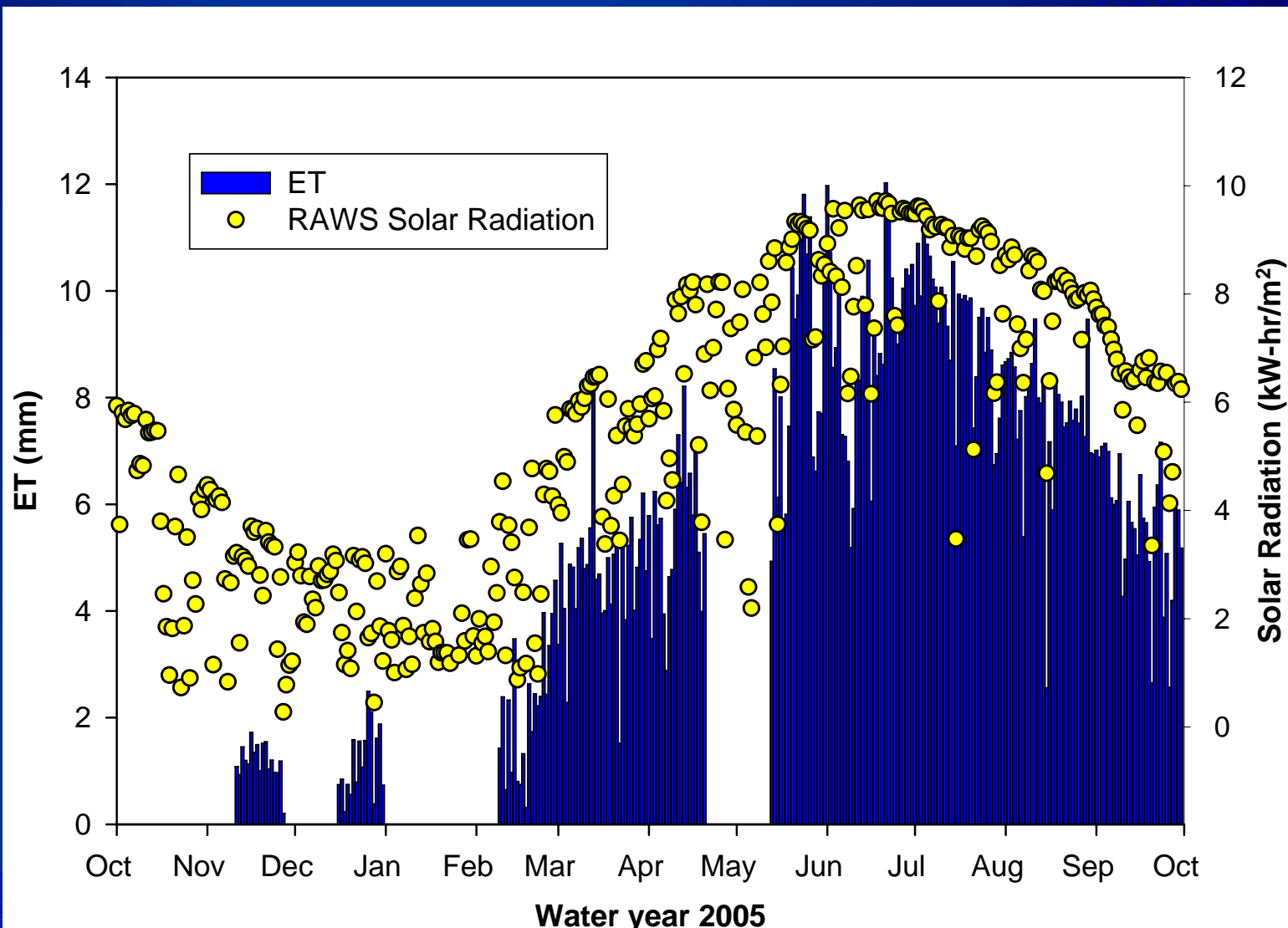
Measured ET on Walker Lake

Provisional—Subject to revision



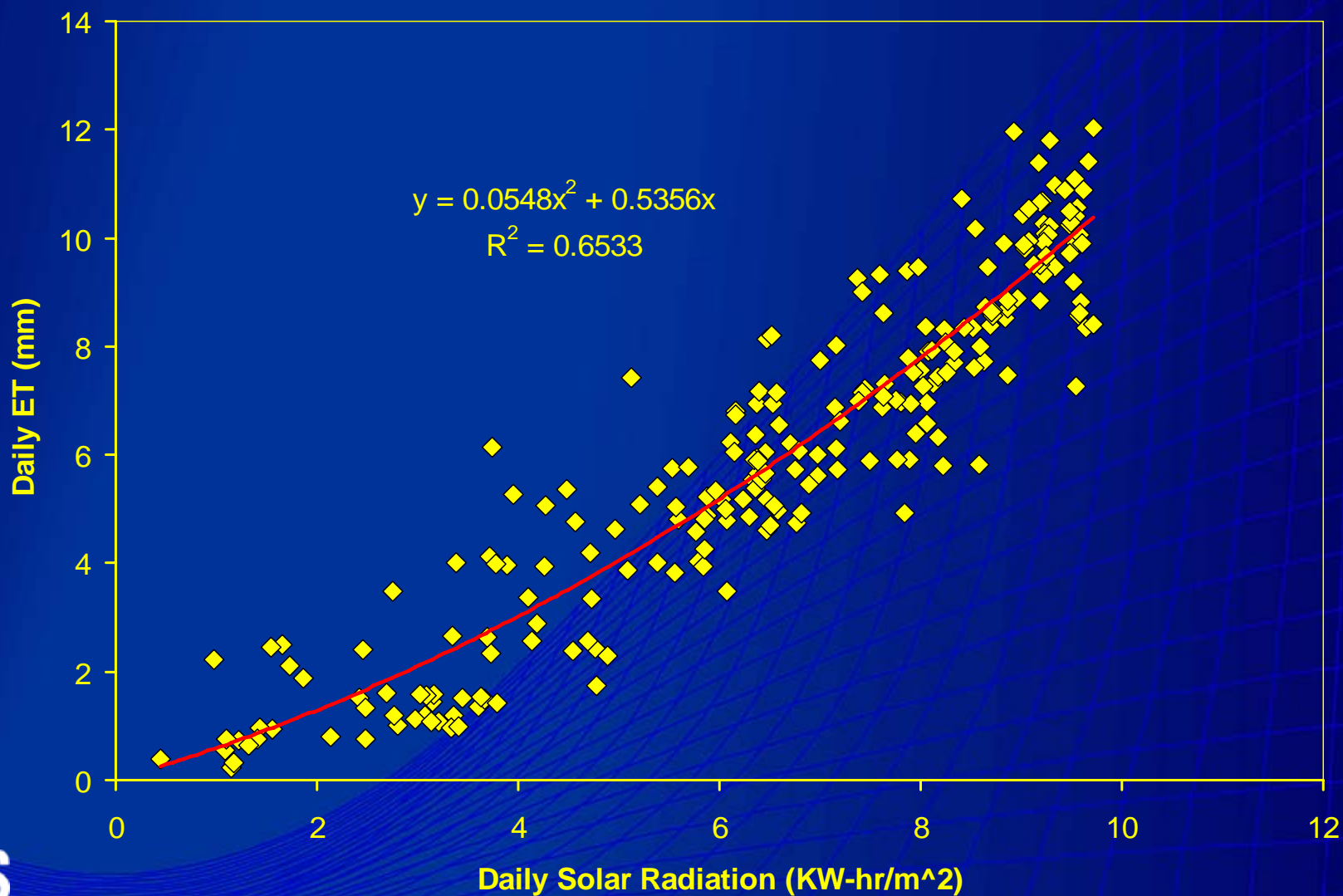
ET compared with RAWS Radiation

Provisional—Subject to revision



ET vs RAWS radiation

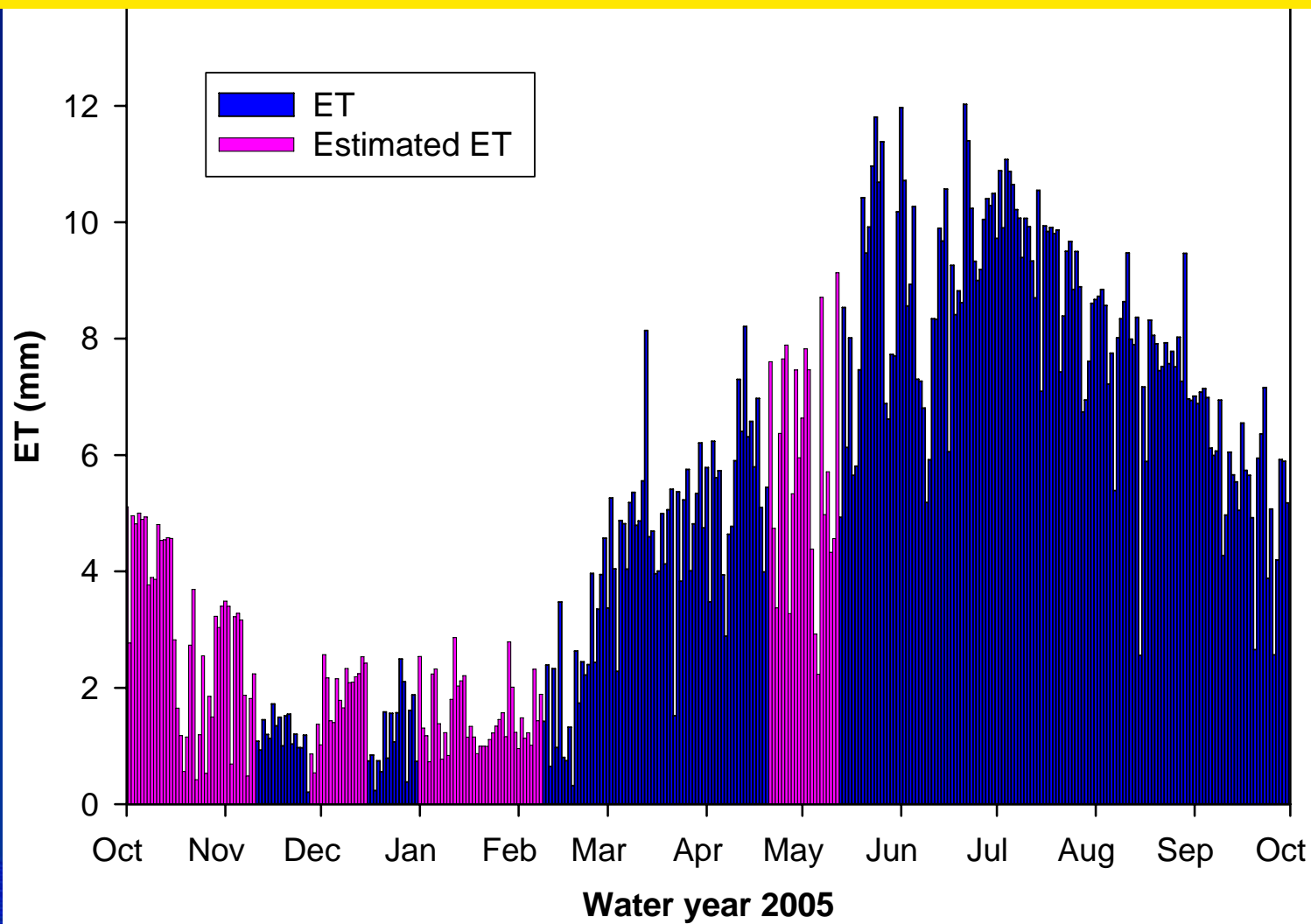
Provisional—Subject to revision



Total ET for 2005 Water Year

Provisional—Subject to revision

Total 2005 Water Year ET = 1814 mm or 6.0 ft*



Results – ET from Walker Lake

- ET for WY2005 was 6.0 ft*, up from previous estimates of 4.1 ft.
- Area of Walker Lake in June 2005 was 32,000 acres.
- Volume evaporated from Walker Lake in 2005 was 192,000 acre-ft*.
- ~ 50% increase over previous estimates.
- If relation between Lake ET and RAWS solar radiation holds, may be able to estimate annual ET from 1999-2004.

* Provisional—Subject to revision

Salt Cedar site

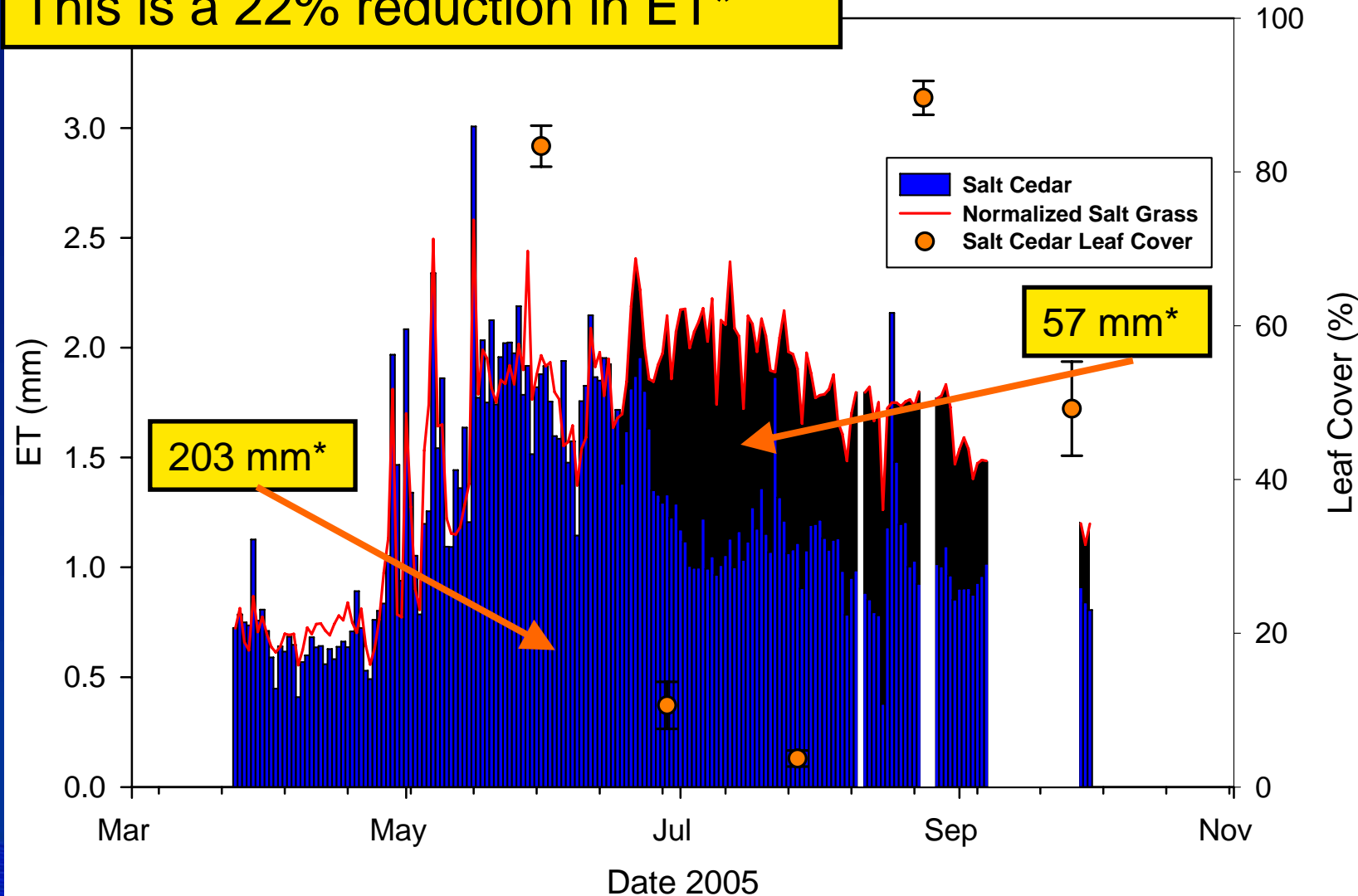
- Site underwent substantial defoliation due to introduction of a biologic control agent: Salt Cedar Leaf Beetle (*Diorhabda elongata*)
- Changed characteristics and ET rate for large stand of Salt Cedar



Reduction of ET using Salt Grass

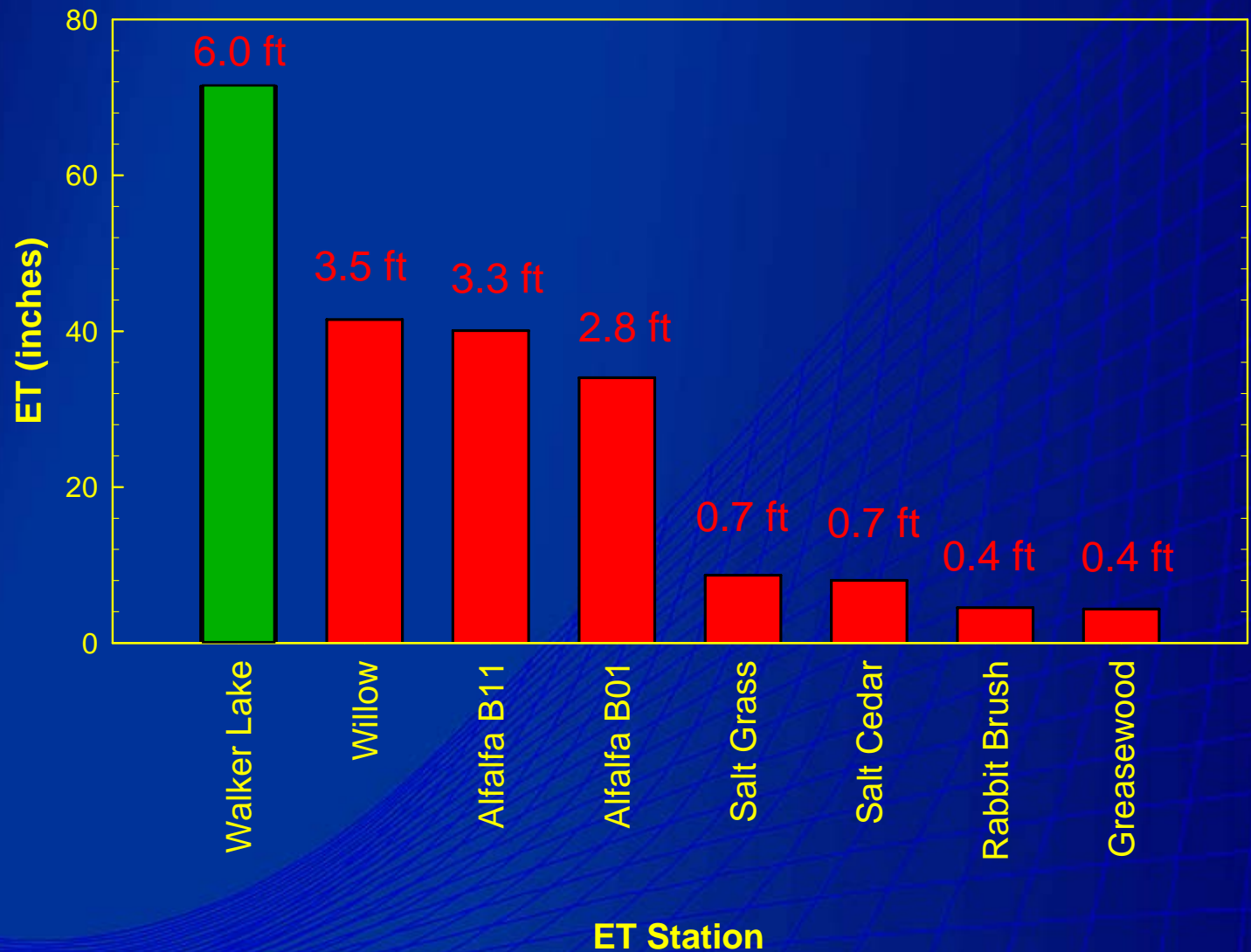
Provisional—Subject to revision

This is a 22% reduction in ET*



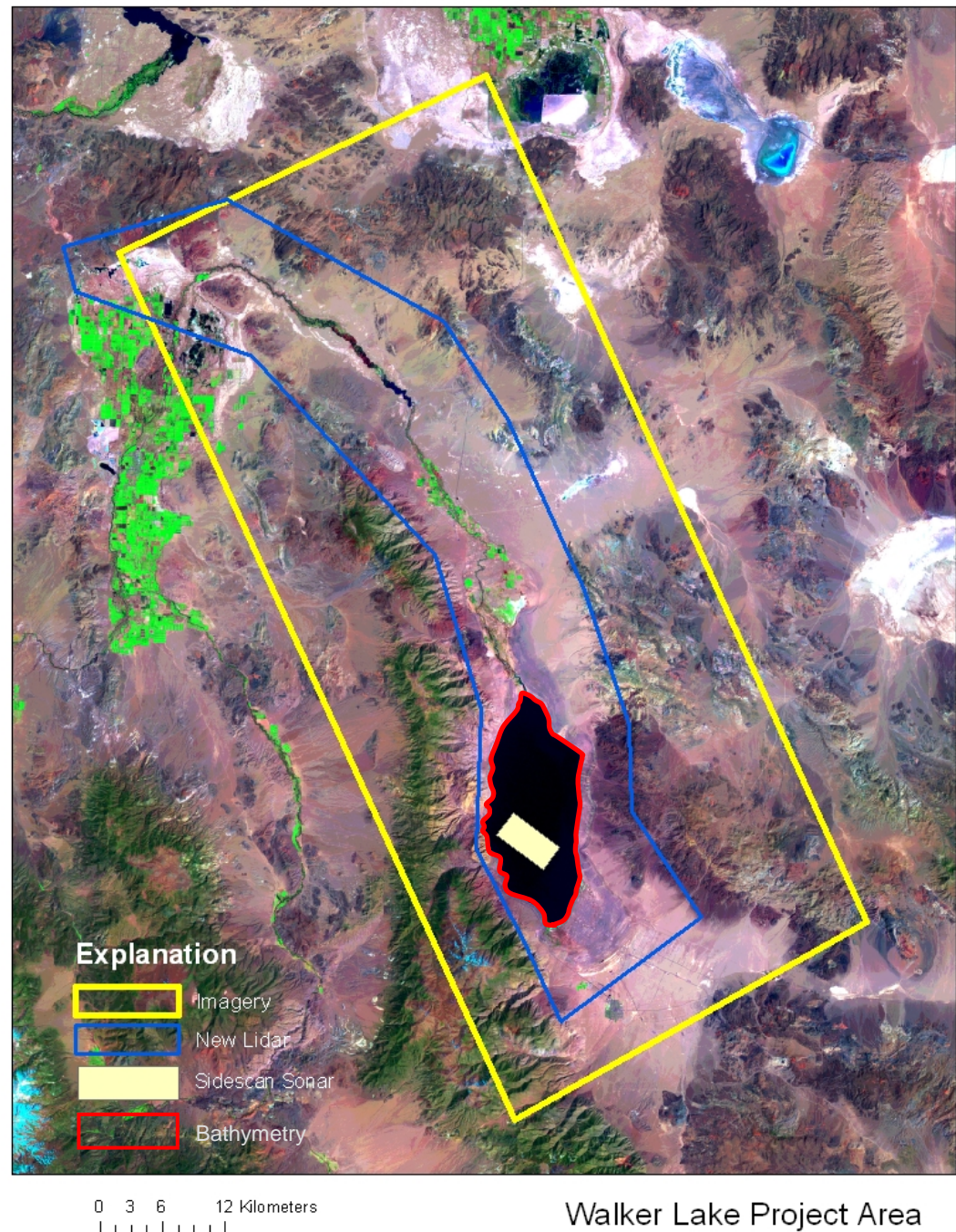
Results – ET Summary

Provisional—Subject to revision

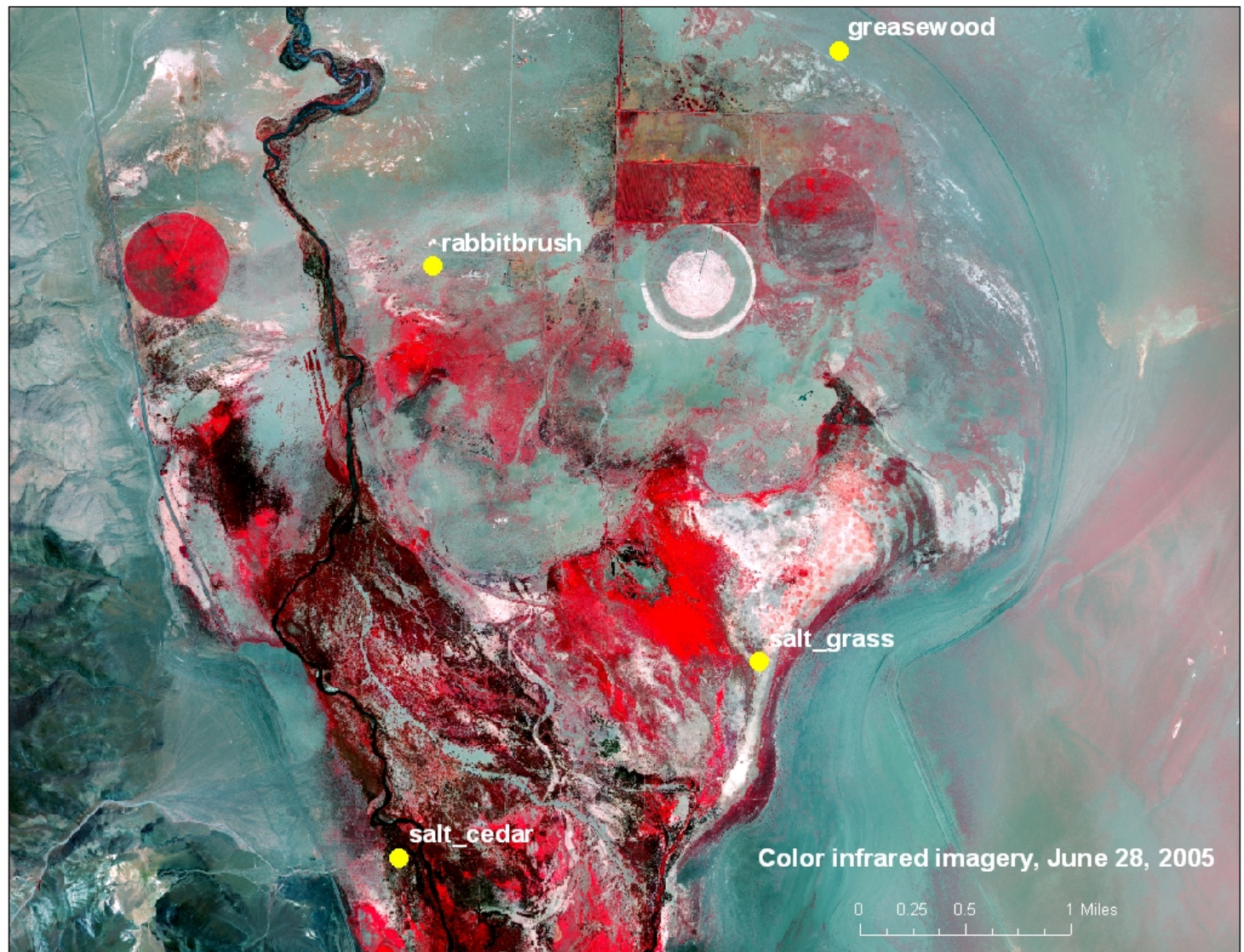


Mapping:

- Satellite imagery
- New imagery
- Lidar
- Bathymetry
- Side-scan sonar

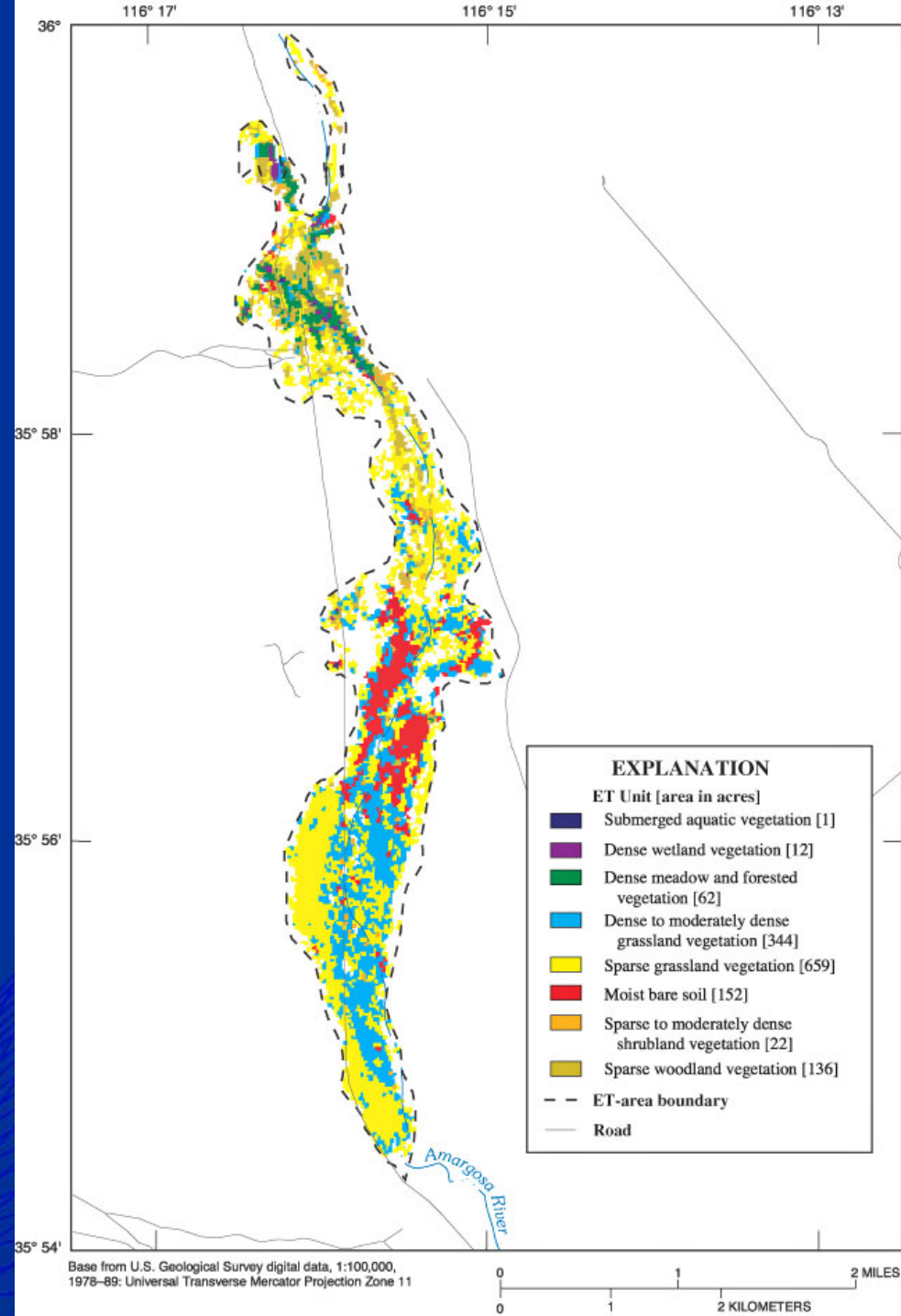


Imagery (infrared)



Scaling up of ET

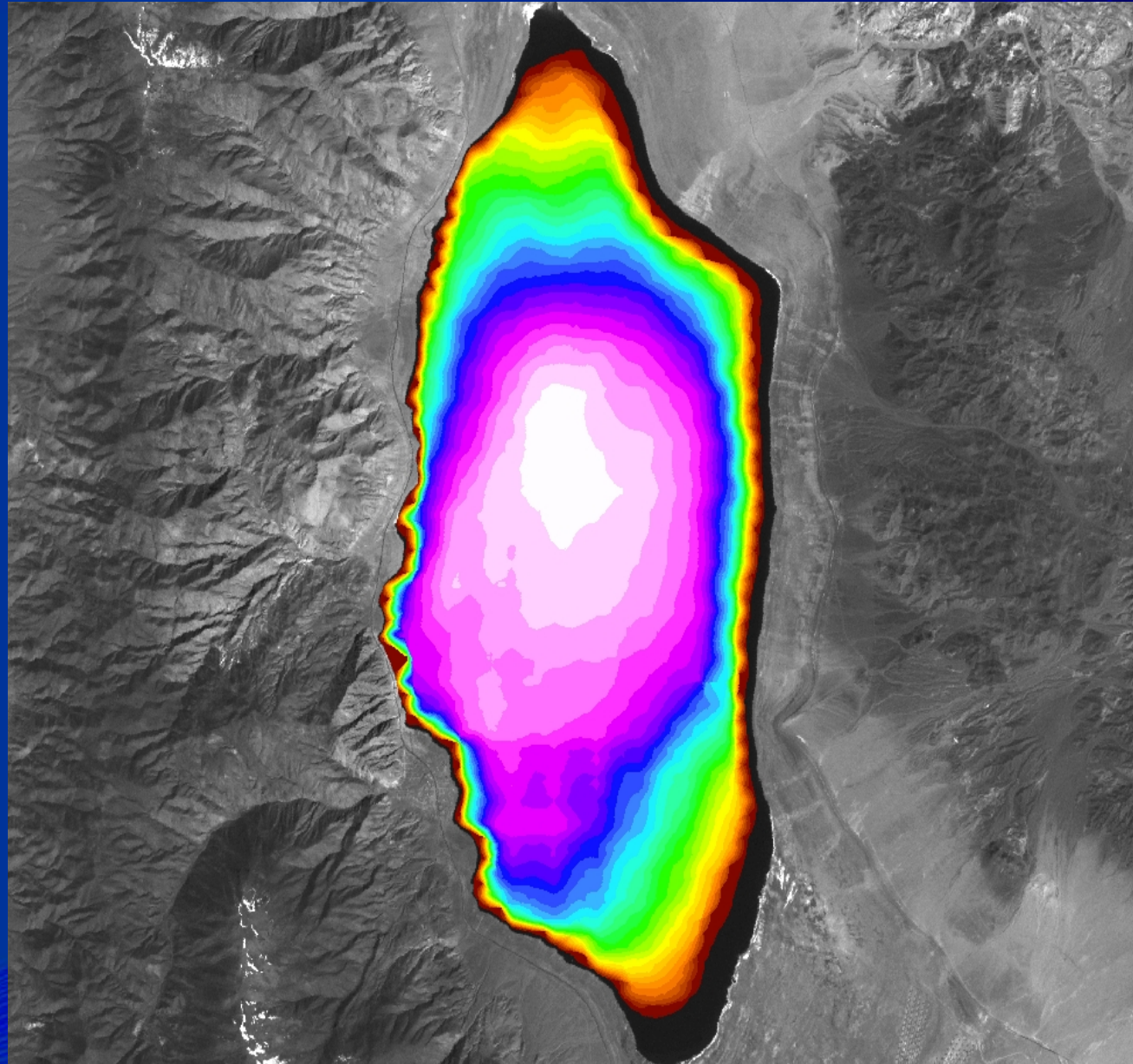
- Create map of ET units
- Extrapolate ET data to ET units to estimate total ET in basin

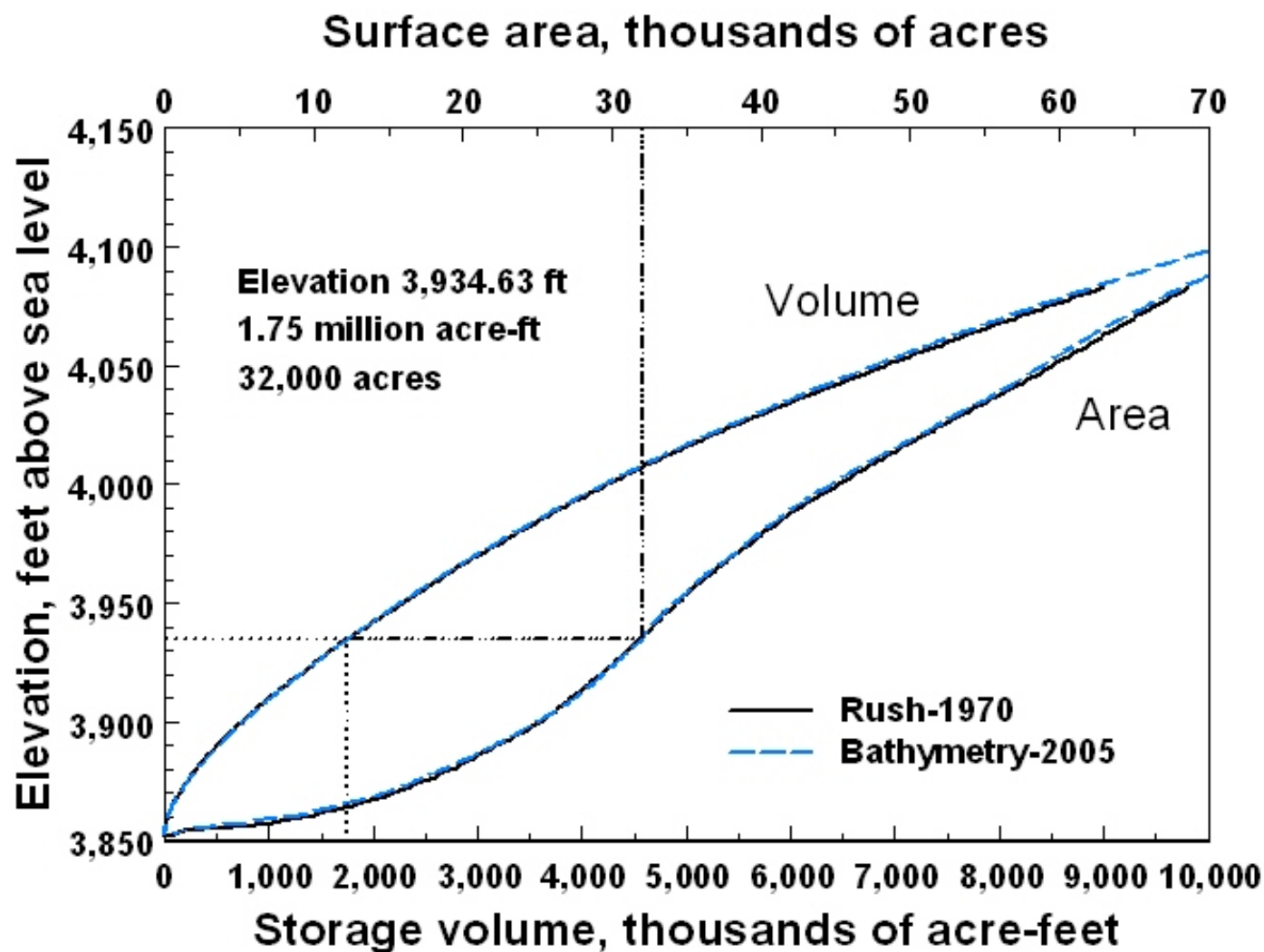


Bathymetry

**Maximum depth
Spring 2005
was 82.8 ft**

Provisional—Subject to revision

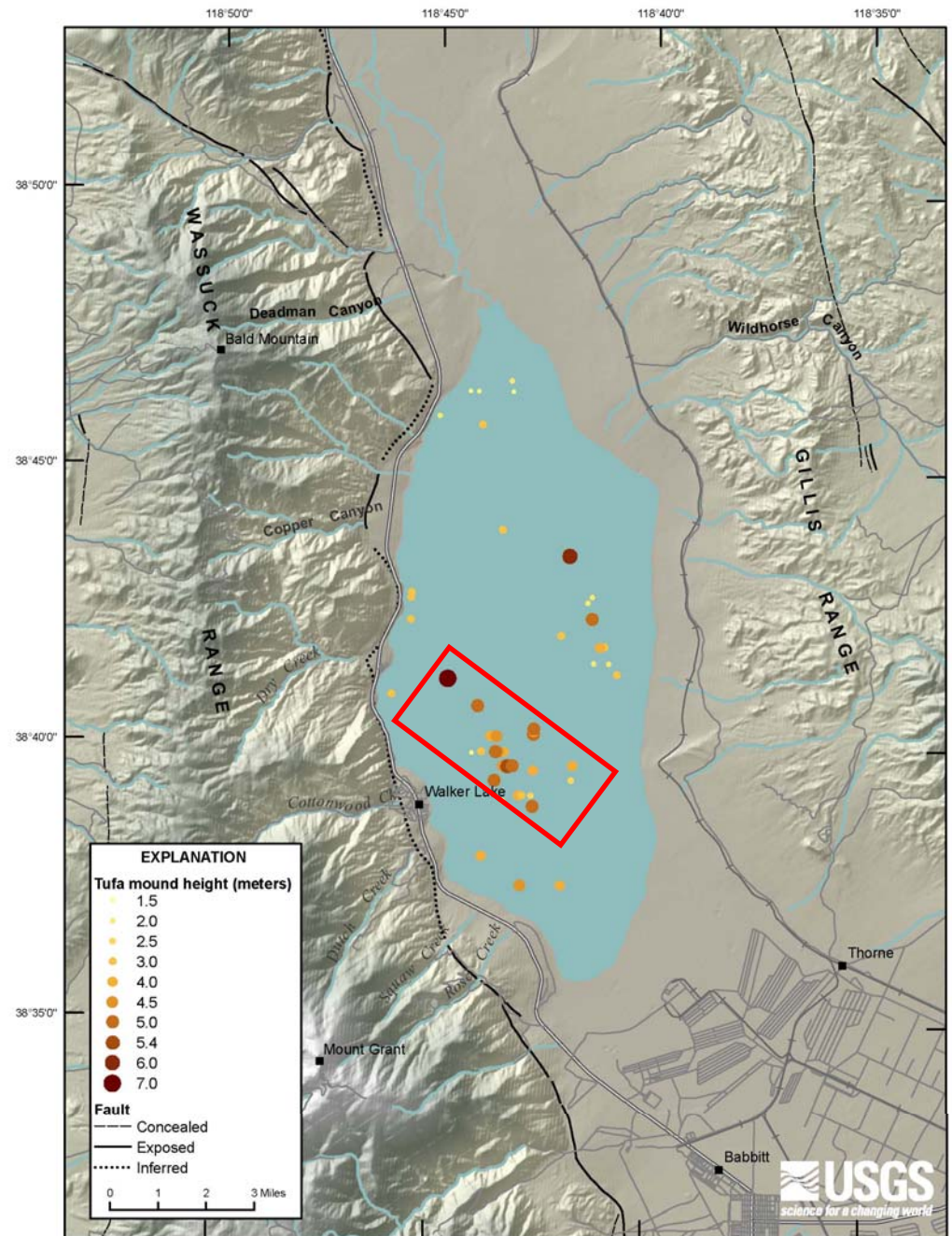




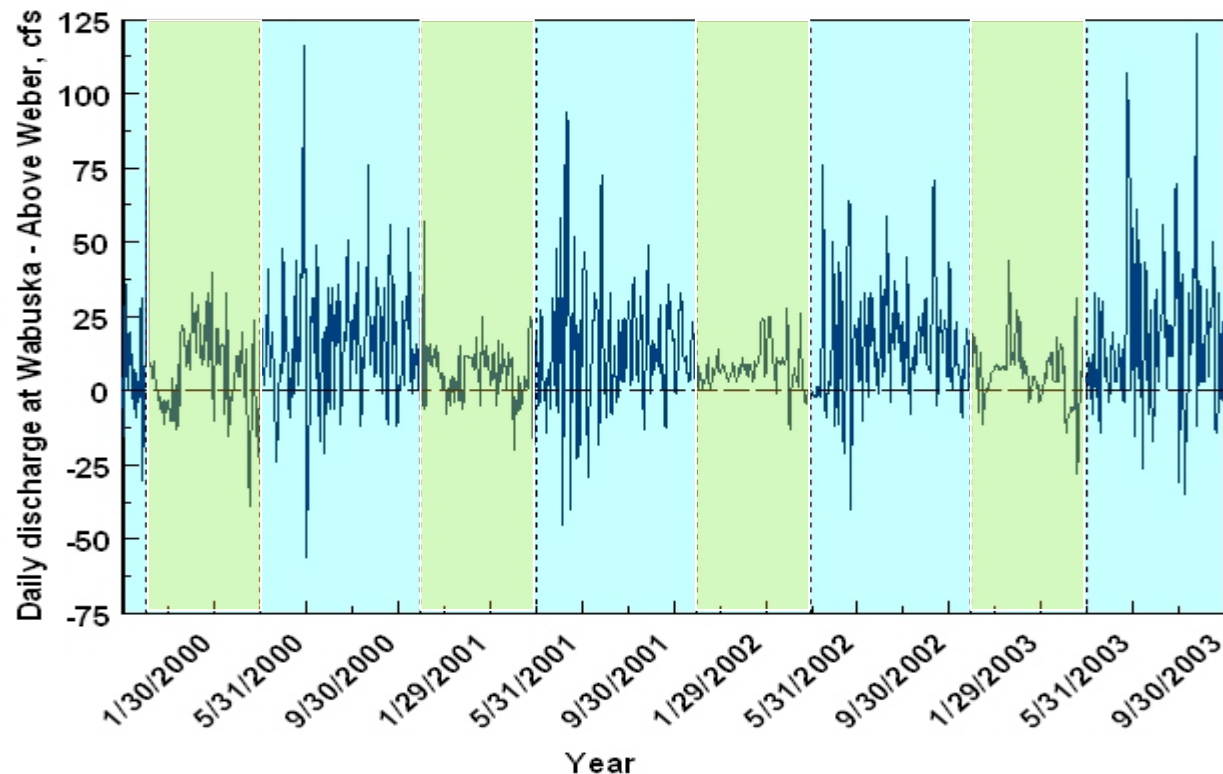
Provisional-Subject to revision

Tufa Mounds in Walker Lake?

- Side-scan sonar
- More GW inflow?

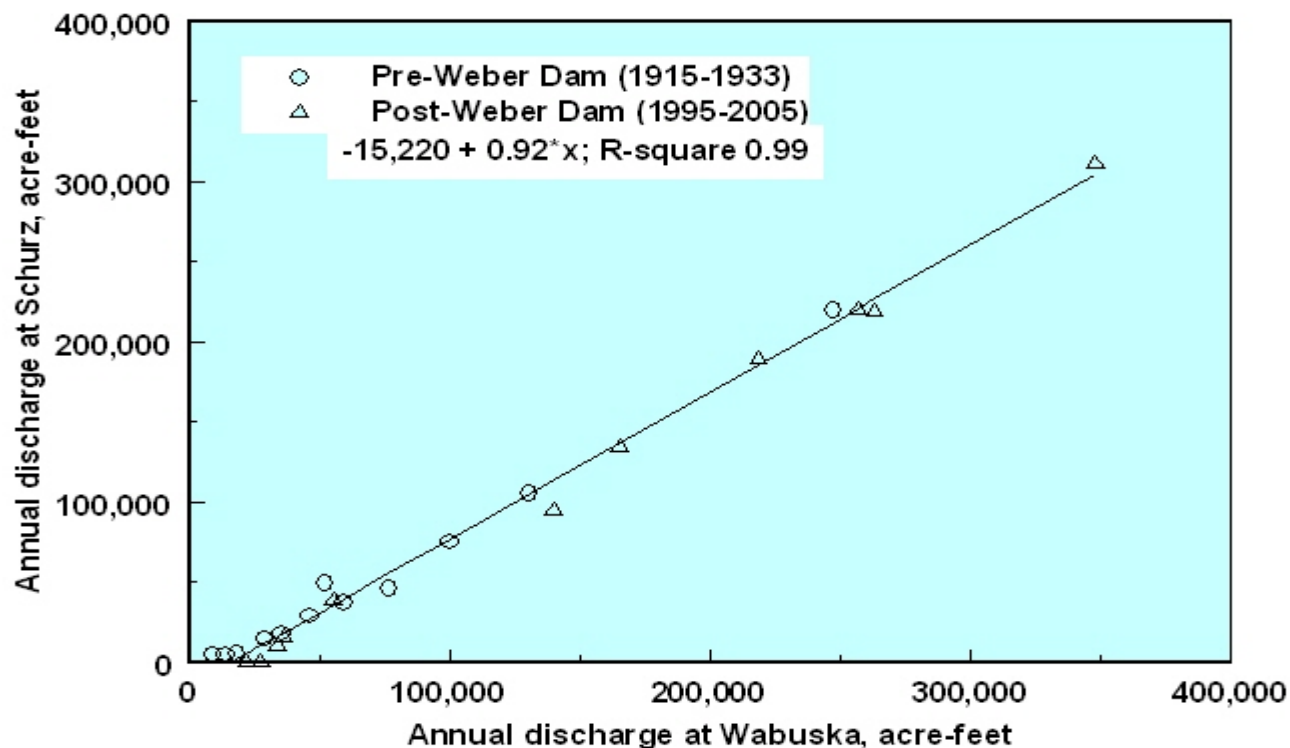


Effect of ET on Streamflow



Preliminary Data-Subject to Revision

Streamflow—Wabuska vs Schurz



Preliminary Data-Subject to Revision

Web Site

Click on Data link for
interactive map page



Objectives

Approach

Maps

Imagery

Schedule

Project Team

Data

Publications

Photo Gallery

Mercury Studies

Related Links

Hydrology of the Walker River Basin

Walker Lake is one of the few perennial, natural terminal lakes in the Great Basin. Terminal lakes are sinks for surface-water drainage in topographically closed basins. Under natural conditions, evaporation from the lake surface typically is the primary component of basin outflow. Due to high evaporation rates in the Great Basin, the water-levels and salinity of terminal lakes are extremely sensitive to changes in streamflow. Most streamflow in the Walker River Basin originates as snowmelt from the Sierra Nevada. Prior to the late 1800s, most of the water flowed into Walker Lake. Since then, agricultural diversions have increased to the point that, except during flood flows, most streamflow is consumed by agriculture. Between 1882 and 1994, upstream diversions caused Walker Lake to decline about 140 feet and the total dissolved solids (TDS) concentrations to increase from 2,500 mg/L to 13,300 mg/L. Currently (2004), the TDS is about 15,000 mg/L. Compared to the Great Salt Lake, Walker Lake is relatively fresh and supports a diverse ecosystem including the threatened Lahontan cutthroat trout (LCT). The LCT has adapted to the high TDS of terminal basins. However, diversions have lowered lake levels and increased TDS to concentrations that threaten its survival.

The ecosystems and recreational uses of Walker Lake and other terminal lakes in the Great Basin have become at-risk due to consumptive water use. The goal of section 2057 of Public Law 107-171 is to provide water to selected at-risk terminal lakes in Nevada in order to sustain their ecosystems. This study will provide scientifically sound data and tools to parties involved in the Walker River Mediation so they can evaluate alternatives for supplementing flow to Walker Lake.

For further information about this study, contact:

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Email: tjlopes@usgs.gov



<http://nevada.usgs.gov/walker/>

PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site

Real-time

GO

[Nevada Water Science Center Annual Data Report](#) This website is an online version of the latest in a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface-water and ground-water data-collection networks in Nevada.

[Station Data Availability Page](#) This page provides links to pages from the Annual Data Report which are specific to this site. These pages may include daily value tables, graphic summary pages and water quality data.

During winter months, stage and discharge may be affected by ice in the channel.

This station managed by the Carson City Field Unit.

Available Parameters

All 4 parameters available at this site

00060 Discharge (DD 01)

00065 Gage height (DD 02)

00010 Temperature, water (DD 04)

Output format

Graph

Days

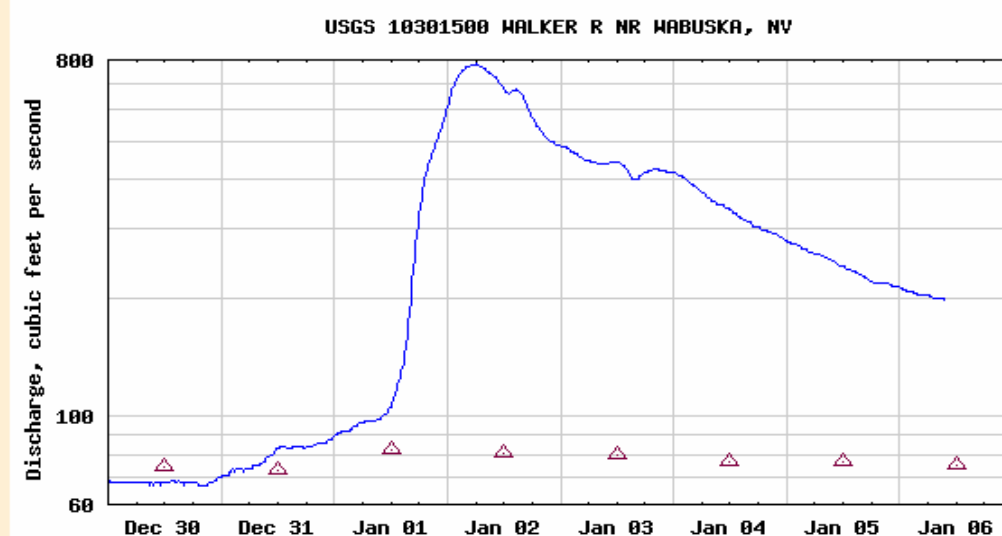
7

(1-31)

get data

Discharge, cubic feet per second

Most recent value: 197 01-06-2006 09:30



Plans for This Year

- Continue to collect data – Data network is essentially in full operation
- Report on bathymetry of Walker Lake
- Classify and map vegetation
- Geophysics near Double Springs, river mouth, and south end of lake
- Install additional observation wells to refine hydrologic understanding of GW system

